Low water levels at the confluence of the Pecos River and the Rio Grande, Amistad National Recreation Area.

> “Warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level.”
>
> *—IPCC 2007*

Changes in temperature, sea level and Northern Hemisphere snow cover

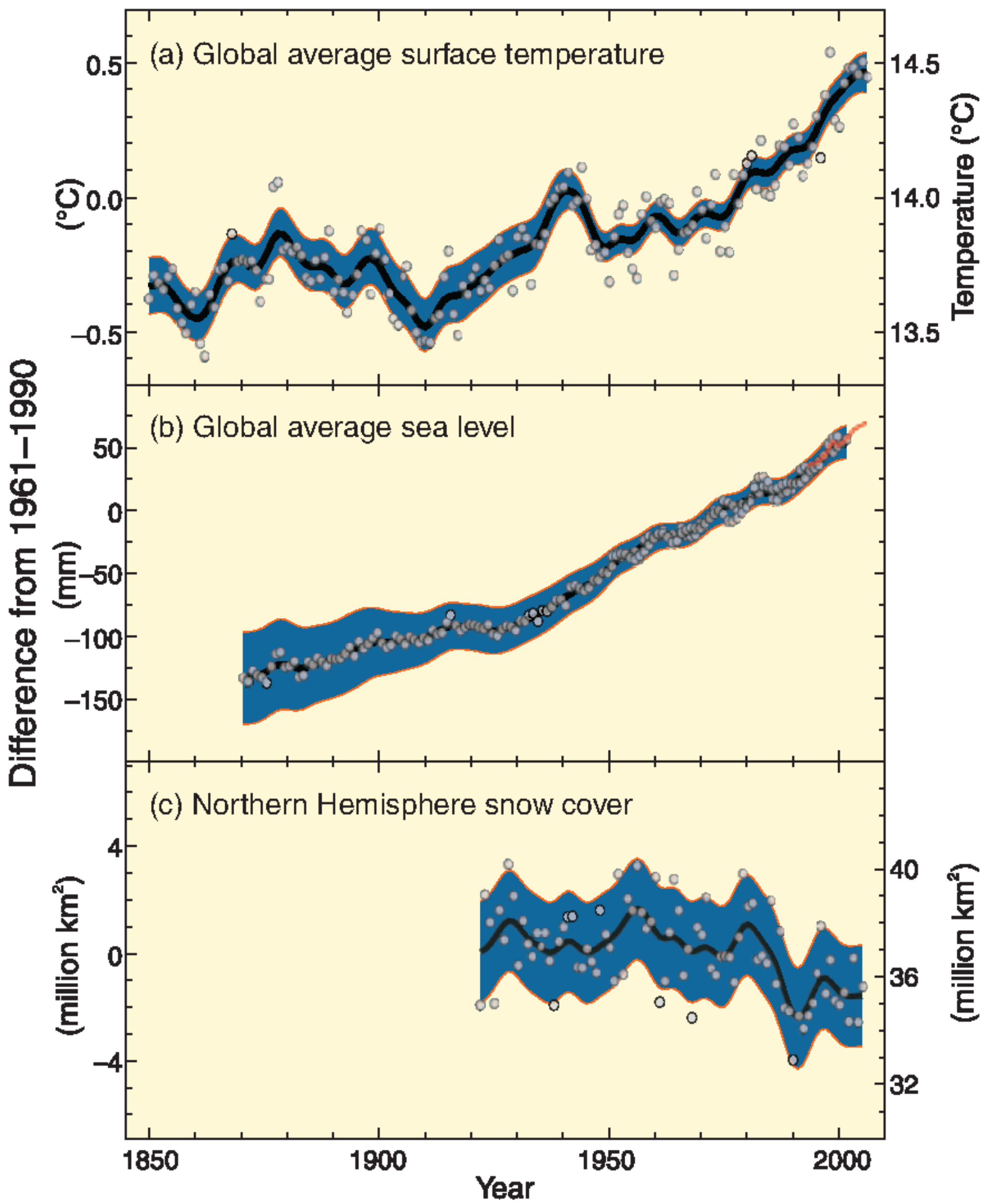

Figure 1. Observed changes in (a) global average surface temperature; (b) global average sea level from tide gauge (blue) and satellite (red) data; and (c) Northern Hemisphere snow cover for March–April. All differences are relative to corresponding averages for the period 1961–1990. Smoothed curves represent decadal averaged values while circles show yearly values. The shaded areas are the uncertainty intervals estimated from a comprehensive analysis of known uncertainties (a and b) and from the time series (c). {WGI FAQ 3.1 Figure 1, Figure 4.2, Figure 5.13, Figure SPM.3} (from IPCC 2007).

Sector	Source Category	Emission Reduction Measure Name	Control Efficiency (%)*	Cost Effectiveness (2006$/ton reduced)	Other pollutants controlled	Description/Notes/Caveats	References
NonPoint	Commercial/ Institutional - Natural Gas	Water heater replacement	45	$0		This control would replace existing water heaters with new water heaters. New water heaters would be required to emit less than or equal to 40 ng NOx per Joule heat output. This control applies to all commercial/institutional natural gas burning water heaters.	EPA 2006b, EPA 1986, EPA 1995f, EPA 1996f, EPA 2007b
NonPoint	Industrial Coal Combustion	RACT to 25 tpy (Low NOx Burner)	21	$2,167		The RACT control technology used is the addition of a low NOx burner to reduce NOx emissions. This standard applies to sources with boilers fueled by coal that emit over 25 tpy NOx.	EPA 2006b, EPA 1986, EPA 1998d, EPA 1996f
NonPoint	Industrial Coal Combustion	RACT to 50 tpy (Low NOx Burner)	21	$2,167		The RACT control technology used is the addition of a low NOx burner to reduce NOx emissions. This standard applies to sources with boilers fueled by coal that emit over 50 tpy NOx.	EPA 2006b, EPA 1986, EPA 1998d, EPA 1996f
NonPoint	Industrial Natural Gas Combustion	RACT to 25 tpy (Low NOx Burner)	31	1NJDEP 2003		The RACT control technology used is the addition of a low NOx burner to reduce NOx emissions. This standard applies to sources with boilers fueled by natural gas that emit over 50 tpy NOx.	EPA 2006b, EPA 1986, EPA 1998d, EPA 1996f
NonPoint	Industrial Natural Gas Combustion	RACT to 50 tpy (Low NOx Burner)	31	1NJDEP 2003		The RACT control technology used is the addition of a low NOx burner to reduce NOx emissions. This standard applies to sources with boilers fueled by natural gas that emit over 50 tpy NOx.	EPA 2006b, EPA 1986, EPA 1998d, EPA 1996f
NonPoint	Industrial Oil Combustion	RACT to 25 tpy (Low NOx Burner)	36	$1,894		The RACT control technology used is the addition of a low NOx burner to reduce NOx emissions. This standard applies to sources with boilers fueled by oil that emit over 25 tpy NOx.	EPA 2006b, EPA 1986, EPA 1998d, EPA 1996f
NonPoint	Industrial Oil Combustion	RACT to 50 tpy (Low NOx Burner)	36	$1,894		The RACT control technology used is the addition of a low NOx burner to reduce NOx emissions. This standard applies to sources with boilers fueled by oil that emit over 50 tpy NOx.	EPA 2006b, EPA 1986, EPA 1998d, EPA 1996f
NonPoint	Open Burning	Episodic Ban (Daily Only)	100	$0		This is a generic control measure that would ban open burning on days where ozone exceedances were predicted, reducing NOx emissions on those days. This measure would not reduce the annual emissions.	EPA 2006b, EPA 1986, EPA 2007b, EPA 1996f
NonPoint	Process Heaters - Distillate Oil, Residual Oil, or Other Fuel	Low NOx Burner and Selective Noncatalytic Reduction	75	$3,691 for NOx<1 tpd and $1,990 for NOx>1 tpd		This control is the use of low NOx burner (LNB) technology and selective non-catalytic reduction (SNCR) to reduce NOx emissions. LNBs reduce the amount of NOx created from reaction between fuel nitrogen and oxygen by lowering the temperature of one combustion zone and reducing the amount of oxygen available in another. SNCR controls are post-combustion control technologies based on the chemical reduction of nitrogen oxides (NOx) into molecular nitrogen (N2) and water vapor (H2O). This control is applicable to process heaters fired with distillate, residual oil, and other unclassified fuels.	EPA 2006b, Pechan 2001, EPA 1998e, EPA 2002a, EPA 1993c
NonPoint	Residential/Commercial/ Institutional Water Heaters and/or Space Heaters	Low NOx Water Heaters and Low NOx Burner Space Heaters	7-75	$928-$1,974		This control is the use of low NOx burner (LNB) technology to reduce NOx emissions. LNBs reduce the amount of NOx created from reaction between fuel nitrogen and oxygen by lowering the temperature of one combustion zone and reducing the amount of oxygen available in another. The South Coast and Bay Area AQMDs set emission limits for water heaters and space heaters. This control is based on the installation of low-NOx space heaters and water heaters in residential, commercial and institutional sources for the reduction of NOx emissions.	EPA 2006b, EPA 1986, EPA 2007b, SCAQMD 1996a, Pechan 2006, EPA 1996f
NonEGU Point	Adipic Acid Manufacturing	Extended Absorption	86	$144		This control is the use of extended absorption technologies to reduce NOx emissions. This control applies to adipic acid manufacturing operations.	EPA 2006b, EPA 1998e, EPA 1991
NonEGU Point	Adipic Acid Manufacturing	Thermal Reduction	81	$674		This control is the application of Thermal Reduction controls to Adipic Acid Manufacturing sources to reduce NOx emissions. Thermal reduction reduces NOx by reaction with excess fuel in a reducing environment. NOx laden stream and excess fuel mixture passes through a burner where the mixture is heated above its ignition temperature. The hot gases then pass through one or more chambers to provide sufficient residence time to ensure complete combustion.	EPA 2006b
NonEGU Point	Ammonia Production - Natural Gas-Fired Reformers	Low NOx Burner	50	$1,316 for NOx<1 tpd and $1,043 for NOx>1 tpd		This control is the use of low NOx burner (LNB) technology to reduce NOx emissions. LNBs reduce the amount of NOx created from reaction between fuel nitrogen and oxygen by lowering the temperature of one combustion zone and reducing the amount of oxygen available in another. This control is applicable to natural-gas fired reformers involved in the production of ammonia with uncontrolled NOx emissions greater than 10 tons per year.	EPA 2006b, Pechan 2001, EPA 1998e, EPA 2002a, EPA 1994g
NonEGU Point	Ammonia Production - Natural Gas-Fired Reformers	Low NOx Burner and Flue Gas Recirculation	60	$4,109 for NOx<1 tpd and $947 for NOx>1 tpd		This control is the use of low NOx burner (LNB) technology and flue gas recirculation (FGR) to reduce NOx emissions. LNBs reduce the amount of NOx created from reaction between fuel nitrogen and oxygen by lowering the temperature of one combustion zone and reducing the amount of oxygen available in another. This control is applicable to natural-gas fired reformers involved in the production of ammonia with uncontrolled NOx emissions greater than 10 tons per year.	EPA 2006b, Pechan 2001, EPA 1998e, EPA 2002a, EPA 1993c
NonEGU Point	Ammonia Production - Natural Gas-Fired Reformers	Oxygen Trim and Water Injection	65	$1,091 for NOx<1 tpd and $514 for NOx>1 tpd		This control is the use of oxygen trim and water injection to reduce NOx emissions.Water is injected into the gas turbine, reducing the temperatures in the NOx-forming regions. The water can be injected into the fuel, the combustion air or directly into the combustion chamber. This control is applicable to natural-gas fired reformers involved in the production of ammonia with uncontrolled NOx emissions greater than 10 tons per year.	EPA 2006b, Pechan 2001, EPA 1998e, EPA 2002a, ERG 2000, EPA 1994g

Sector	Source Category	Emission Reduction Measure Name	Control Efficiency (%)*	Cost Effectiveness (2006$/ton reduced)	Other pollutants controlled	Description/Notes/Caveats	References
NonEGU Point	Ammonia Production - Natural Gas-Fired Reformers	Selective Catalytic Reduction	90	$2,852		This control is the selective catalytic reduction of NOx through add-on controls. SCR controls are post-combustion control technologies based on the chemical reduction of nitrogen oxides (NOx) into molecular nitrogen (N2) and water vapor (H2O). The SCR utilizes a catalyst to increase the NOx removal efficiency, which allows the process to occur at lower temperatures. This control is applicable to natural-gas fired reformers involved in the production of ammonia with uncontrolled NOx emissions greater than 10 tons per year.	EPA 2006b, EPA 2007b, EPA 1998e, EPA 2002a, EPA 2007d, Sorrels 2007
NonEGU Point	Ammonia Production - Natural Gas-Fired Reformers	Selective Non-Catalytic Reduction	50	$6,211 for NOx<1 tpd and $2,520 for NOx>1 tpd		This control is the reduction of NOx emission through selective non-catalytic reduction add-on controls. SNCR controls are post-combustion control technologies based on the chemical reduction of nitrogen oxides (NOx) into molecular nitrogen (N2) and water vapor (H2O). This control is applicable to natural-gas fired reformers involved in the production of ammonia with uncontrolled NOx emissions greater than 10 tons per year.	EPA 2006b, Pechan 2001, EPA 1998e, EPA 2002a, EPA 1994g
NonEGU Point	Ammonia Production - Oil-Fired Reformers	Low NOx Burner	50	$642 for NOx<1 tpd and $690 for NOx>1 tpd		This control is the use of low NOx burner (LNB) technology to reduce NOx emissions. LNBs reduce the amount of NOx created from reaction between fuel nitrogen and oxygen by lowering the temperature of one combustion zone and reducing the amount of oxygen available in another. This control is applicable to oil-gas fired reformers involved in the production of ammonia with uncontrolled NOx emissions greater than 10 tons per year.	EPA 2006b
NonEGU Point	Ammonia Production - Oil-Fired Reformers	Low NOx Burner and Flue Gas Recirculation	60	$1,798 for NOx<1 tpd and $626 for NOx>1 tpd		This control is the use of low NOx burner (LNB) technology and flue gas recirculation (FGR) to reduce NOx emissions. LNBs reduce the amount of NOx created from reaction between fuel nitrogen and oxygen by lowering the temperature of one combustion zone and reducing the amount of oxygen available in another. This control is applicable to oil-gas fired reformers involved in the production of ammonia with uncontrolled NOx emissions greater than 10 tons per year.	EPA 2006b
NonEGU Point	Ammonia Production - Oil-Fired Reformers	Selective Catalytic Reduction	80	$2,375 for NOx<1 tpd and $1,300 for NOx>1 tpd		This control is the selective catalytic reduction of NOx through add-on controls. SCR controls are post-combustion control technologies based on the chemical reduction of nitrogen oxides (NOx) into molecular nitrogen (N2) and water vapor (H2O). The SCR utilizes a catalyst to increase the NOx removal efficiency, which allows the process to occur at lower temperatures. This control is applicable to oil-gas fired reformers involved in the production of ammonia with uncontrolled NOx emissions greater than 10 tons per year.	EPA 2006b
NonEGU Point	Ammonia Production - Oil-Fired Reformers	Selective Non-Catalytic Reduction	50	$4,141 for NOx<1 tpd and $1,685 for NOx>1 tpd		This control is the reduction of NOx emission through selective non-catalytic reduction add-on controls. SNCR controls are post-combustion control technologies based on the chemical reduction of nitrogen oxides (NOx) into molecular nitrogen (N2) and water vapor (H2O). This control is applicable to oil-gas fired reformers involved in the production of ammonia with uncontrolled NOx emissions greater than 10 tons per year.	EPA 2006b
NonEGU Point	Asphalt Plant Manufacture	Low NOx Burner and Flue Gas Recirculation	30-50	N/A		This control is the use of low NOx burner (LNB) technology and flue gas recirculation (FGR) to reduce NOx emissions. LNBs reduce the amount of NOx created from reaction between fuel nitrogen and oxygen by lowering the temperature of one combustion zone and reducing the amount of oxygen available in another. This control is applicable to asphalt plant manufacturing sources.	STAPPA/ALAPCO 2006
NonEGU Point	Asphaltic Concrete - Rotary Dryer - Conventional Plant	Low NOx Burner	50	$3,531 for NOx<1 tpd and $2,889 for NOx>1 tpd		This control is the use of low NOx burner (LNB) technology to reduce NOx emissions. LNBs reduce the amount of NOx created from reaction between fuel nitrogen and oxygen by lowering the temperature of one combustion zone and reducing the amount of oxygen available in another. This control is applicable to construction operations with rotary driers and uncontrolled NOx emissions greater than 10 tons per year.	EPA 2006b, EPA 1998e, EPA 2002a, EPA 1993c
NonEGU Point	By-Product Coke Manufacturing - Oven Underfiring	Selective Non-Catalytic Reduction	60	$2,632		This control is the reduction of NOx emission through selective non-catalytic reduction add-on controls. SNCR controls are post-combustion control technologies based on the chemical reduction of nitrogen oxides (NOx) into molecular nitrogen (N2) and water vapor (H2O). This control applies to all by-product coke manufacturing operations with oven underfiring and uncontrolled NOx emissions greater than 10 tons per year.	EPA 2006b, Pechan 2001, EPA 1998e, EPA 2002a, EPA 1994e
NonEGU Point	Cement Kilns	Biosolid Injection Technology	23	$407		This control is the use of biosolid injection to reduce NOx emissions. This control applies to cement kilns.	EPA 2006b, EPA 2007c
NonEGU Point	Cement Kilns	Changing feed composition	25-40	$587		This control is changing the cement formulation by adding steel slag to lower the clinkering temperatures and supress NOx. The patented feed modifi cation technique known as the CemStar Process is a raw feed modifi cation process that can reduce NOx emissions by about 30 percent and increase production by approximately 15 percent. It involves the addition of a small amount of steel slag to the raw kiln feed. Steel slag has a chemical composition similar to clinker and many of the chemical reactions required to convert steel slag to clinker take place in the steel furnace. By substituting steel slag for a portion of the raw materials, facilities can increase thermal effi ciency and thereby reduce NOx emissions. This control is applicable to wet- and dry-process kilns, as well as those with preheaters or precalciners.	STAPPA/ALAPCO 2006

Sector	Source Category	Emission Reduction Measure Name	Control Efficiency (%)*	Cost Effectiveness (2006$/ton reduced)	Description/Notes/Caveats	References
NonPoint	Adhesives - Industrial	Reformulation	73	$3,534	This control is the use of product reformulation and product substitution for industrial adhesives to achieve VOC emissions reductions. It is based on SCAQMD rule 1168, which requires the use of waterborne, hot melt, UV cured or reactive diluent adhesives. Add-on controls such as carbon absorption and afterburners are more costly for this source category and generally not used.	Pechan 1997, SCAQMD 1996a
NonPoint	Aerosol Coatings		19		EPA promulgated national VOC emission standards for aerosol coatings during 2008. EPA estimated that the aerosol coatings rule will achieve the equivalent of a 19 percent reduction in mass VOC emissions from the 1990 baseline. The year 1990 represents the baseline, since there has been no previous Federal rulemaking for aerosol coatings. The creditable reduction that may be claimed is 0.114 pounds per capita. To estimate equivalent VOC mass reductions for credit purposes, EPA computed the VOC reductions that would have been achieved by a mass-based rule equivalent in ozone formation reduction to the reactivity-based rule. This calculation was based in work done by the California ARB. ARB had previously developed a mass-based rule whose limits were later determined to be technically infeasible. The California reactivity-based rule was developed by ARB as an equivalent replacement for the mass-based rule's VOC limits.	
NonPoint	Architectural, Traffic, and Industrial Maintenance Coatings	OTC Model Rule	31	$6,612	The baseline against which the control efficiencies are listed for this source category comes from the existing Federal AIM rule 40CFR Part 59 from 2002, which is estimated to provide a 20 percent VOC reduction from the uncontrolled (1990 baseline) emissions. The OTC developed a Model Rule for AIM Coatings that requires manufacturers to reformulate coatings to meet specified VOC content limits, which are based on the SCM adopted by ARB and the STAPPA/ALAPCO model rule for AIM Coatings.	LADCO 2006b, OTC 2001b
NonPoint	Architectural, Traffic, and Industrial Maintenance Coatings	OTC Model Rule and South Coast -Rule 1113 Phase III VOC limits	40	$20,664	This control is the adoption of SCAQMD Rule 1113 Phase III VOC Emission Limits in addition to the Architectural, Traffic, and Industrial Maintenance (AIM) coatings OTC Model Rule limits. Phase III relies on near-zero or zero VOC formulations for several architectural coating categories including, but not limited to, cleanup and thinning solvents, clear wood finishes, exterior opaque stains, semi-transparent stains, sanding sealers, and waterproofing sealers.	OTC 2001a, LADCO 2006b
NonPoint	Bakery Products	Catalytic Incineration	40	$2,359	The control measure is based on the regulation adopted by the BAAQMD, which assumes emissions reductions from the use of catalytic incinerators. These incinerators use a catalyst to achieve very high control efficiencies at relatively low operating temperatures (320 to 650 °C). The BAAQMD control requirements affect only large, commercial bread bakeries. The equivalent SCAQMD Rule is 1153.	EPA 1990a, EPA 1992c, EPA 1995c, M&S 1991, Schultz 1997
NonPoint	Coating Operations at Aerospace Manufacturing and Rework Operations	Control Technology Guidelines	18-50		This CTG identifies presumptive RACT for controlling VOC emissions from aerospace coatings and cleaning solvents. The baseline against which the control efficiencies are listed for this source category comes from the aerospace manufacturing and rework operations NESHAP federal rule (60 FR 45948). Aerospace manufacturing and rework operations typically consist of the following basic operations: materials receiving, machining and mechanical processing, coating application, chemical milling, heat treating, cleaning, metal processing and finishing, coating removal (depainting), composite processing, and testing. Of these operations, coating application and cleaning are the significant sources of VOC emissions and are the processes covered by this CTG. The principal technique used by the aerospace industry to control VOC emissions is product substitution, which eliminates or reduces the generation of emissions (waterborne and high solids materials used as coating substitution). Several equipment changes can also directly reduce the level of VOC emissions (high transfer efficiency spray guns, spray gun cleaners, and conventional high transfer efficiency methods). The control efficiency range provided if for equipment change.	EPA 1997f
NonPoint	Cold Cleaning Degreasing	Process Modification	95	$15,703	This control is modifications to the cold cleaning process to reduce the fugitive VOC emissions. This is based on SCAQMD Rule 1122, which was most recently amended in 2009.	SCAQMD 1996a, SCAQMD 1997
NonPoint	Cold Cleaning Degreasing	Reformulation-Process Modification (OTC Rule)	8	$1,688	The baseline against which the control efficiencies are listed for this source category comes from the MACT standard for Cold Cleaning processes. This control establishes hardware and operating requirements for specified vapor cleaning machines, as well as solvent volatility limits and operating practices for cold cleaners.	SCAQMD 1997, OTC 2001a

NonPoint	Metal Can Surface Coating	Permanent Total Enclosure (PTE)	92	$9,621	A permanent total enclosure (PTE) completely surrounds a source of emissions such that all VOC emissions are captured and contained for discharge to a control device. A metal can is defined as a usually cylindrical metal container, but governmental agencies and industry groups use differing criteria to identify cans including shape, materials, capacity, phase of product contained, and material thickness (gauge). Decorative tins, bottle caps and jar lids are also included in the can coating category since many of these items are coated on the same line where can coating takes place. Cans consist of can bodies and can ends. Metal can surface coating facilities include two-piece beverage can body facilities, twopiece food can body facilities, one-piece aerosol can body facilities, sheetcoating facilities, three-piece food can body assembly facilities, three-piece non-food can body assembly facilities, and end lining facilities. EPA evaluated VOC emission control options for the two-piece beverage can, twopiece food can and sheetcoating facilities using a PTE in conjunction with a thermal oxidizer in the MACT standard-setting process for this source category. The option presented here has applicability to processes that use "high" VOC content materials (solvent-borne materials).	EPA 2006b
NonPoint	Metal Can Surface Coating	Process Modification	9	$3,221	The baseline against which the control efficiencies are listed for this source category comes from the Metal Can Surface Coating NESHAP federal rule (68 FR 64432). This control includes modifications to the metal can coating process to reduce the fugitive VOC emissions. This control measure is based on the 1997 amendment to the San Francisco Bay Area AQMD rule which defined VOC content limits for body spray coatings for both two and three piece cans and set VOC limits for end sealing compounds for non-food products; and set limits for interior and exterior body sprays used on drums, pails, and lids (BAAQMD, 1999).	BAAQMD 1999
NonPoint	Metal Coil Surface Coating	Incineration	84	$14,344	This control measure based on the use of incineration to reduce VOC emissions from metal coil coating facilities. Coatings are applied to metal coils to improve appearance and prevent corrosion. This rule is assumed to cover both two and three piece coil coating. This control applies to area source VOC emissions for the metal coil coating source category. The option presented here has applicability to processes that use "high" VOC content materials (solvent-borne materials).	EPA 1998d
NonPoint	Metal Coil Surface Coating	Permanent Total Enclosure (PTE)	92	$9,621	A permanent total enclosure (PTE) completely surrounds a source of emissions such that all VOC emissions are captured and contained for discharge to a control device. A metal can is defined as a usually cylindrical metal container, but governmental agencies and industry groups use differing criteria to identify cans including shape, materials, capacity, phase of product contained, and material thickness (gauge). Decorative tins, bottle caps and jar lids are also included in the can coating category since many of these items are coated on the same line where can coating takes place. Cans consist of can bodies and can ends. Metal can surface coating facilities include two-piece beverage can body facilities, twopiece food can body facilities, one-piece aerosol can body facilities, sheetcoating facilities, three-piece food can body assembly facilities, three-piece non-food can body assembly facilities, and end lining facilities. EPA evaluated VOC emission control options for the two-piece beverage can, twopiece food can and sheetcoating facilities using a PTE in conjunction with a thermal oxidizer in the MACT standard-setting process for this source category. The option presented here has applicability to processes that use "high" VOC content materials (solvent-borne materials).	EPA 2006b
NonPoint	Metal Coil Surface Coating	Process Modification	9	$3,221	The baseline against which the control efficiencies are listed for this source category comes from the Metal Coil Surface Coating NESHAP federal rule (68 FR 39793). This control includes modifications to the metal coil coating process to reduce the fugitive VOC emissions. This control measure is based on the 1997 amendment to the San Francisco Bay Area AQMD rule which defined VOC content limits for body spray coatings for both two and three piece cans and set VOC limits for end sealing compounds for non-food products; and set limits for interior and exterior body sprays used on drums, pails, and lids (BAAQMD, 1999).	BAAQMD 1999
NonPoint	Metal Furniture Surface Coating	Reduced Solvent Utilization	84	$118	The baseline against which the control efficiencies are listed for this source category comes from the Metal Furniture Surface Coating NESHAP federal rule (68 FR 28605). This control is the implementation of reduced solvent utilization to reduce VOC emissions from metal furniture surface coating.	STAPPA/ALAPCO 1993, CDPR 1999
NonPoint	Metal Furniture, Appliances, Parts	Reformulation-Process Modification	36	$4,043	The SCAQMD amended rule 1107 sets stringent VOC emission limits for metal coatings. VOC emissions can be reduced by using reformulated low-VOC content compliant coatings, powder coating for both general and high gloss coatings, UV curable coatings, high transfer efficiency coating applications, and increased effectiveness of add-on control equipment. The metal coating source category classifies emissions that result from the coating of metal parts and products including machinery and equipment and railroad rolling stock. In 2006, this rule was amended again, ratcheting down the VOC limits on certain categories of coatings and making HVLP sprayers mandatory for all end users.	SCAQMD 1996a, EPA 1995h, SCAQMD 2005b

photos (clockwise from top right): MMS; NOAA; Navy; NOAA; NSF; NOAA

I. Introduction

The ocean, our coasts, and the Great Lakes are among our most treasured resources. They are an integral part of our national identity and our future. A healthy marine environment feeds our Nation, fuels our economy, supports our cultures, provides and creates jobs, gives mobility to our Armed Forces, enables safe movement of goods, and provides places for recreation. Healthy, productive, and resilient oceans, coasts, and Great Lakes contribute significantly to our quality of life.

At the same time, these resources are vulnerable to activities and impacts that diminish their health, productivity, and resilience. Pollution, for example, degrades marine habitats, reduces access to recreational and commercial opportunities, and threatens public health and safety. Habitat loss impacts the stability of marine populations, leading to significant economic and cultural consequences. Overfishing